

April 28, 2016

**Via Electronic Filing**

Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street SW  
Washington, DC 20554

**Re: Notice of Ex Parte Communication: Amendment of Parts 15, 73 and 74 of the Commission's Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band for Use By White Space Devices and Wireless Microphones, MB Docket 15-146; Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12-268**

Dear Ms. Dortch:

On April 26, 2016, Andy Lee and Aparna Sridhar of Google Inc., Paul Caritj of Harris, Wiltshire & Grannis LLP, and I spoke via telephone with Gary Epstein, Chair, Incentive Auction Task Force; Howard Symons, Vice-Chair of the Incentive Auction Task Force; Walter Johnston, Chief Electromagnetic Compatibility Division ("ECD"), Office of Engineering and Technology ("OET"); Martin Doczkat, Technical Analysis Branch Chief, ECD; Paul Murray, Associate Chief, OET; Karen Rackley, Technical Rules Branch Chief, Policy and Rules Division, OET; Mark Colombo, OET; Hugh Van Tuyl, OET; William Scher, Assistant General Counsel, Office of General Counsel; Bill Lake, Chief, Media Bureau; and Joyce Bernstein of the Media Bureau.

We discussed Google's simulation results, as presented in its March 25, 2016 *ex parte* letter. These results demonstrate that the Commission's vacant-channel proposal will have only a minimal effect on LPTV and translator stations. Indeed, as explained below, the National Association of Broadcasters ("NAB") has itself made clear that the proposed vacant-channel rule will have no material incremental impact on low-power broadcasting beyond the effect of the Congressionally mandated incentive auction and repacking.

Google's simulation provides the only substantial data in the record that predict the effect of the proposed vacant-channel rule on LPTV and translator stations. Recent filings by the National Association of Broadcasters ("NAB") fail to address this issue, instead attempting to conflate the effect of the incentive auction and overall repacking with the effect of the vacant-channel proposal. NAB's filings offer little, if any, insight into the merits of the vacant-channel proposal, and are not evidence on which the FCC could rely when resolving this proceeding.<sup>1</sup>

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<sup>1</sup> See, e.g., Letter from Rick Kaplan, General Counsel and Executive Vice President, National Association of Broadcasters, to Marlene H. Dortch, Secretary, FCC, at 1, MB Docket No. 15-

The statutorily mandated auction, and the repacking effects NAB reports, will occur whether the FCC adopts its vacant-channel proposal or not. The vacant-channel proposal will not substantially increase the impact on LPTV and translator stations.

NAB tacitly concedes this point. NAB has claimed that the vacant-channel proposal “when coupled with the already damaging effect the auction will have”<sup>2</sup> means that “one-quarter of all UHF LPTV and translator stations in the U.S. may be unable to find new UHF channels following the auction.”<sup>3</sup> But it also stated, in the same filing, that “even before the FCC would follow through on its [vacant channel] proposal . . . one quarter of UHF LPTV and translator stations may be displaced.” If, as NAB claims, one quarter of LPTV and translator stations may go off the air in total due to the combined effects of the repack and vacant-channel rule, and one quarter of stations would also go off the air solely as a result of the repack, then the marginal effect of the vacant-channel proposal itself will be negligible. *NAB and Google thus agree that there will be no material adverse effect on broadcasters from the vacant channel rule.*

The Google representatives also answered questions from FCC staff on aspects of Google’s analysis. First, we explained that the analysis takes its assumptions about the number of broadcasters that will participate and sell their licenses in the reverse auction from the FCC itself. Using the FCC’s published numbers is appropriate for modeling nationwide auction dynamics. Because these percentages are nationwide averages, they can be expected to both overestimate and underestimate broadcaster participation in certain outlier communities, but these edge cases do not change the core result of the analysis.

To illustrate this point, Google shared new simulation results for the Albuquerque market, which NAB cites as a potential outlier. The new simulation did not rely on the Commission’s participation assumptions, and instead used an essential-stations analysis to test the impact with the minimum possible broadcaster participation. In this analysis, Google conducted 15,000 new simulations and, in each one, determined the absolute minimum broadcaster participation, analyzing each full-power broadcaster to determine whether it would be required to sell its license in the reverse auction to meet a given clearing target (or, put

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146 (filed April 18, 2016) (“NAB reviewed its analysis demonstrating that the auction and repacking will result in up to one quarter of LPTV and translator stations being unable to find new channels after the auction”) (“April NAB Letter”); Letter from Rick Kaplan, General Counsel and Executive Vice President, National Association of Broadcasters, to Marlene H. Dortch, Secretary, FCC, at 1, MB Docket No. 15-146 (filed March 31, 2016) (“as many as one-quarter of all UHF LPTV and translator stations in the U.S. may be unable to find new UHF channels following the auction”) (“March NAB Letter”).

<sup>2</sup> March NAB Letter at 1.

<sup>3</sup> *Id.*

another way, whether the station’s participation is essential to meeting that target). Only essential stations were removed from the band in each simulation before LPTV and translator stations were repacked and tested for compliance with the vacant-channel rule.

Because different combinations of broadcasters might be required to sell their licenses given varying patterns of broadcaster participation, numerous simulations remained necessary to generate reliable results. For example, consider a greatly simplified scenario with only two channels available, and with three stations to be repacked, none of which can operate on the same channel. In this scenario, each of these mutually exclusive stations may or may not be “essential” depending on whether the others choose to sell their licenses. A real broadcast television market may include many such interrelationships. A reliable simulation must recognize this uncertainty and account for the resulting variability in potential auction outcomes.

In this Albuquerque-specific analysis using the smallest number of broadcast participants possible, the results are functionally identical to the previous simulation results, deviating from the previous results by no more than 0.01% percentage points.

MTA39-Albuquerque Results Based on FCC Nationwide Participation Predictions		MTA39-Albuquerque Results Based on Essential-Stations Analysis	
LPTV	Translators	LPTV	Translators
0.01%	0.04%	0.001%	0.03%

Thus, while changes in broadcaster participation produce a more tightly packed post-auction band, they do not significantly change the number of stations *affected by the vacant-channel rule itself*. This is because a more tightly packed band still leaves gaps suitable for white-space operations.<sup>4</sup> The Commission has proposed that the vacant-channel showing would be made by demonstrating that forty milliwatt personal/portable devices can operate in one

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<sup>4</sup> This may not be true, however, in markets like Los Angeles where full-power broadcasters are so numerous, and channels are so limited due to cross-border restrictions, that the Commission may be forced to place a broadcaster in the duplex gap. These markets, not relatively rural areas like Albuquerque, are where the vacant-channel showing is most needed to promote certainty and, therefore, to support investment in unlicensed technologies. Moreover, the loss of the duplex gap and the prevalence of WMTS sites make the certainty afforded by the vacant-channel rule especially important in such urban markets.

broadcast channel, consistent with the Commission's existing rules for those devices.<sup>5</sup> Low-power personal/portable devices cover far smaller geographic areas than broadcasters, are not subject to adjacent-channel restrictions with respect to nearby broadcasters, and observe different separation distances—characteristics that make it possible to fit unlicensed users into small spectral and geographic gaps. In addition, the proposed vacant-channel rule would not require that the same channel remain vacant throughout a broadcaster's proposed contour, providing increased flexibility in the accommodation of low-power unlicensed devices.

Second, FCC staff asked about Google's use of Major Trading Areas ("MTAs") as geographic units when conducting its analysis. Google explained that it selected these markets in an attempt to model as much geography as possible while limiting computational complexity, which grows geometrically with the number of broadcasters included in the simulation. To ensure that MTA-wide results do not obscure significant effects concentrated in more limited areas, Google already has provided information about the most affected counties in its simulations, as well as detailed maps illustrating the effect county-by-county throughout each market.<sup>6</sup>

Third, FCC staff asked about the use of the number of pre-auction versus post-auction stations as denominators in calculating percentages. Google explained that its reported percentage results reflect the percentage of LPTV/translator stations on the air today that will likely not be able to successfully make the Commission's proposed vacant-channel showing. This calculation best allows an LPTV station on the air today to understand the likelihood that it will be affected by the vacant-channel showing (as opposed to the auction). In many cases, the average percentages were so small that less than a single station is likely to be affected. This reflects the fact that, in these cases, many of the 15,000 simulations for a given market predicted that zero stations would be affected. These results, averaged together with other non-zero results, yielded averages that are greater than zero, but also less than a single station.

If we calculate the percentage of LPTV and translator stations that would be affected by the vacant-channel rule relative to the stations that would remain on the air after the auction, instead of relative to the number on the air today, the effect of the rule still is vanishingly small, as shown in the following results for Albuquerque.

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<sup>5</sup> *Amendment of Parts 15, 73 and 74 of the Commission's Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band For Use By White Space Devices and Wireless Microphones*, MB Docket No. 15-146; *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, 30 FCC Red. 6711, 6726-27 ¶ 37 (2015).

<sup>6</sup> See Letter from Austin C. Schlick, Google, Inc., to Marlene H. Dortch, FCC, at Additional Simulation Results, MB Docket No. 15-146 (filed March 25, 2016) ("Google Analysis").

	MTA39-Albuquerque % Affected of Stations on the Air Today		MTA39-Albuquerque % Affected of Post-Repack Stations	
	LPTV	Translators	LPTV	Translators
Results based on FCC nationwide participation predictions.	0.01%	0.04%	0.04%	0.07%
Results based on “Essential Stations” analysis.	0.001%	0.03%	0.003%	0.04%

Finally, the Google representatives discussed flaws in NAB’s most recent submission that render it worthless for assessing the issue at hand. Most fundamentally, as described above, NAB’s filing analyzes the wrong question. NAB deliberately conflates the effect of the incentive auction itself with the effect of the Commission’s vacant-channel proposal.<sup>7</sup> Whether to conduct an auction was resolved years ago by Congress and is not a question presently before the Commission. The question is what the impact of the proposed vacant-channel rule will be. NAB’s results offer the Commission no help in answering this question.

In addition, because NAB fails to disclose its methodology, the Administrative Procedure Act compels the Commission to disregard NAB’s results. NAB provides insufficient detail about its “graphical repacking algorithm”<sup>8</sup> for an interested party, or the Commission, to evaluate its accuracy or reliability. To rely on such unsupported hand waving would be not only unwise, but also arbitrary and capricious. NAB’s decision to hide its methodology from scrutiny stands in stark contrast to Google’s transparent filings, which include a detailed description of its simulation methodology for the Commission and other interested parties to review.<sup>9</sup>

Moreover, what little detail NAB does provide about its analysis suggests that NAB’s work is unreliable. First, NAB concedes that its results are based on a tiny selection of the FCC’s sample repack scenarios.<sup>10</sup> Such a small number of examples falls far short of the

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<sup>7</sup> See *supra* note 1.

<sup>8</sup> April NAB Letter at 1.

<sup>9</sup> See Google Analysis, Simulation Methodology.

<sup>10</sup> See, e.g., April NAB Letter at 1 (“NAB explained that its analysis is based on two representative FCC repacking profiles”); Reply Comments of the National Association of Broadcasters at 4 n.7, MB Docket No. 15-146 (filed Oct. 30, 2015) (“Channel availability

analytic foundation needed to account for the complex dynamics of the auction and repacking process, where outcomes may differ dramatically depending on which broadcasters choose to participate. Google's analysis accounted for this variability by simulating 15,000 possible auction outcomes *for each market analyzed*.

Second, although its description is unclear, NAB appears to have used F-curves in its "graphical repacking algorithm" to identify possible channel assignments, and then used Longley-Rice and OET-69 only in a subsequent step to confirm that a "graphically" identified repack scenario was indeed permissible.<sup>11</sup> While F-curves are a relatively simple tool for approximating a station's coverage area taking into account only transmit power, antenna pattern, antenna height, and channel of operation,<sup>12</sup> OET-69 uses the significantly more sophisticated Longley-Rice algorithm to predict received power levels at specific locations, taking into account a variety of additional environmental factors such as terrain elevation, ground cover, and climate.<sup>13</sup> NAB's apparent combination of these algorithms, therefore, likely failed to identify possible repack arrangements that are permissible under OET-69 but would not have appeared permissible upon a "graphical" inspection of stations' F-curves. This is a significant error, since one of the purposes of Longley-Rice and OET-69 is to provide a more accurate assessment of the true interference potential between stations for the purpose of facilitating more spectrally efficient broadcast channel assignments. Thus, NAB's apparent use of F-curves in its initial step would systematically understate the number of channels available to broadcasters after the repack. Google's analysis, unlike NAB's, properly used OET-69 at every step of the simulated repacking process.

Third, NAB relied on a number of simplifications in its analysis. NAB contends that these admitted omissions make its results conservative. But while NAB's omissions might cause its analysis to underestimate the impact of the auction and repacking, they tend to exaggerate the likely effect of the vacant-channel rule. For example, NAB concedes that it did not take into account adjacent-channel restrictions between broadcasters<sup>14</sup> or translator daisy chains.<sup>15</sup>

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was determined from a randomly selected scenario, based on a 120 MHz clearing target, from the FCC's publicly-available repacking simulations.").

<sup>11</sup> See April NAB Letter at 1, attachment at 6-10.

<sup>12</sup> See 47 C.F.R. §§ 73.683, 73.684 & 73.699.

<sup>13</sup> See Federal Communications Commission, *OET Bulletin No. 69, Longley-Rice Methodology for Evaluating TV Coverage and Interference* (Feb. 6, 2004), [https://transition.fcc.gov/Bureaus/Engineering\\_Technology/Documents/bulletins/oet69/oet69.pdf](https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet69/oet69.pdf)

<sup>14</sup> See March NAB Letter at 6.

<sup>15</sup> See April NAB Letter, attachment at 11.

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Overlooking such phenomena yields simulated post-auction television bands with unrealistically few white spaces, making the vacant-channel rule seem more difficult to satisfy than it actually will be.

The Commission should, therefore, disregard NAB's analysis: NAB's results are largely irrelevant to this proceeding; its methodology is too opaque to support reasoned decision making; and what little information NAB makes available suggests that its work is plagued with serious methodological flaws. Google's results, on the other hand, rigorously document that the impact of the proposed vacant-channel rule on LPTV and translator stations will be negligible, even without taking into account mechanisms like channel sharing that will reduce this impact still further. Weighing these slight burdens against the significant benefits of promoting investment in new unlicensed technologies, the Commission should adopt its proposed vacant-channel rule.

Sincerely,

A handwritten signature in dark ink, appearing to read "A.P. Margie". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Paul Margie  
*Counsel to Google Inc.*

cc: Meeting Participants